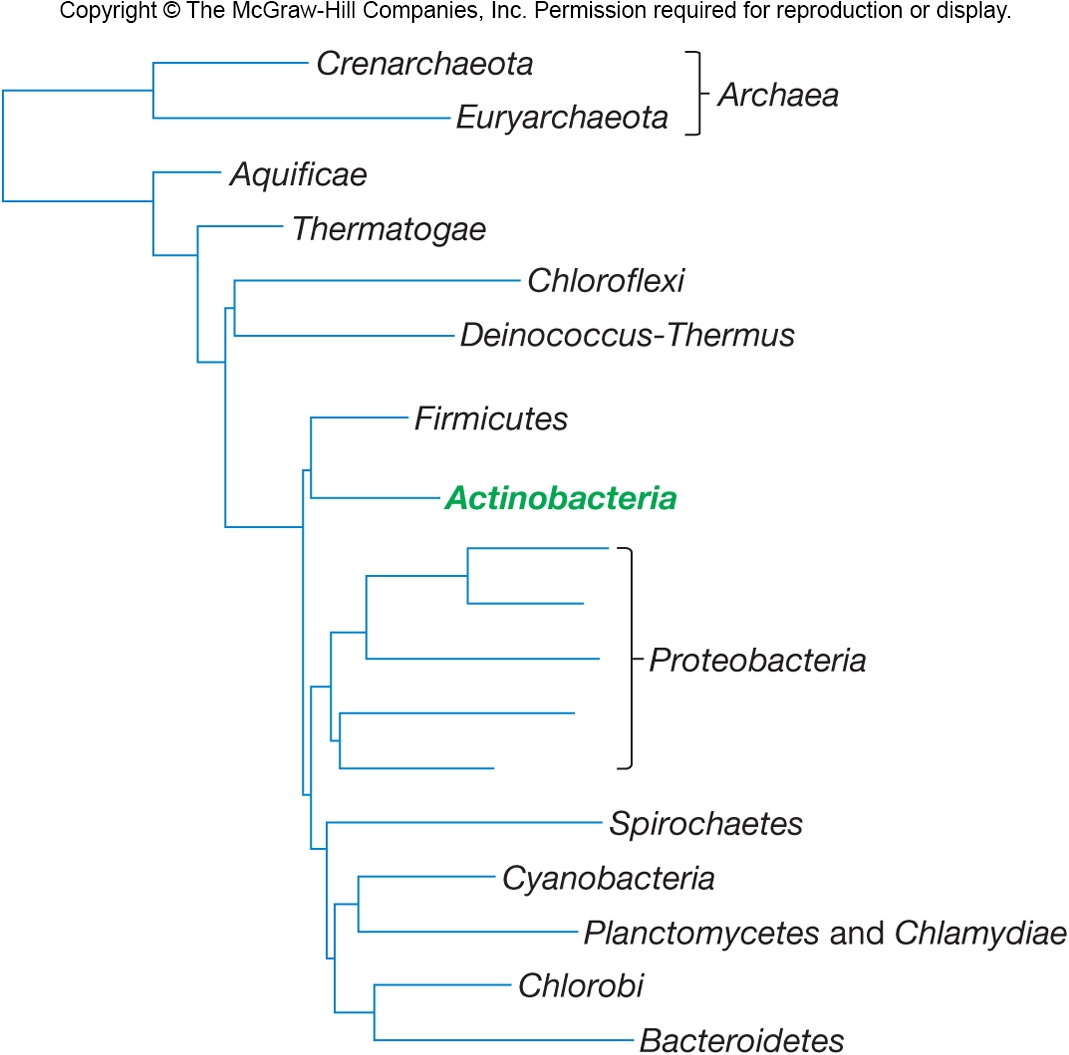
**Bacterial taxonomy Lec .9 Phylum *Actinobacteria***

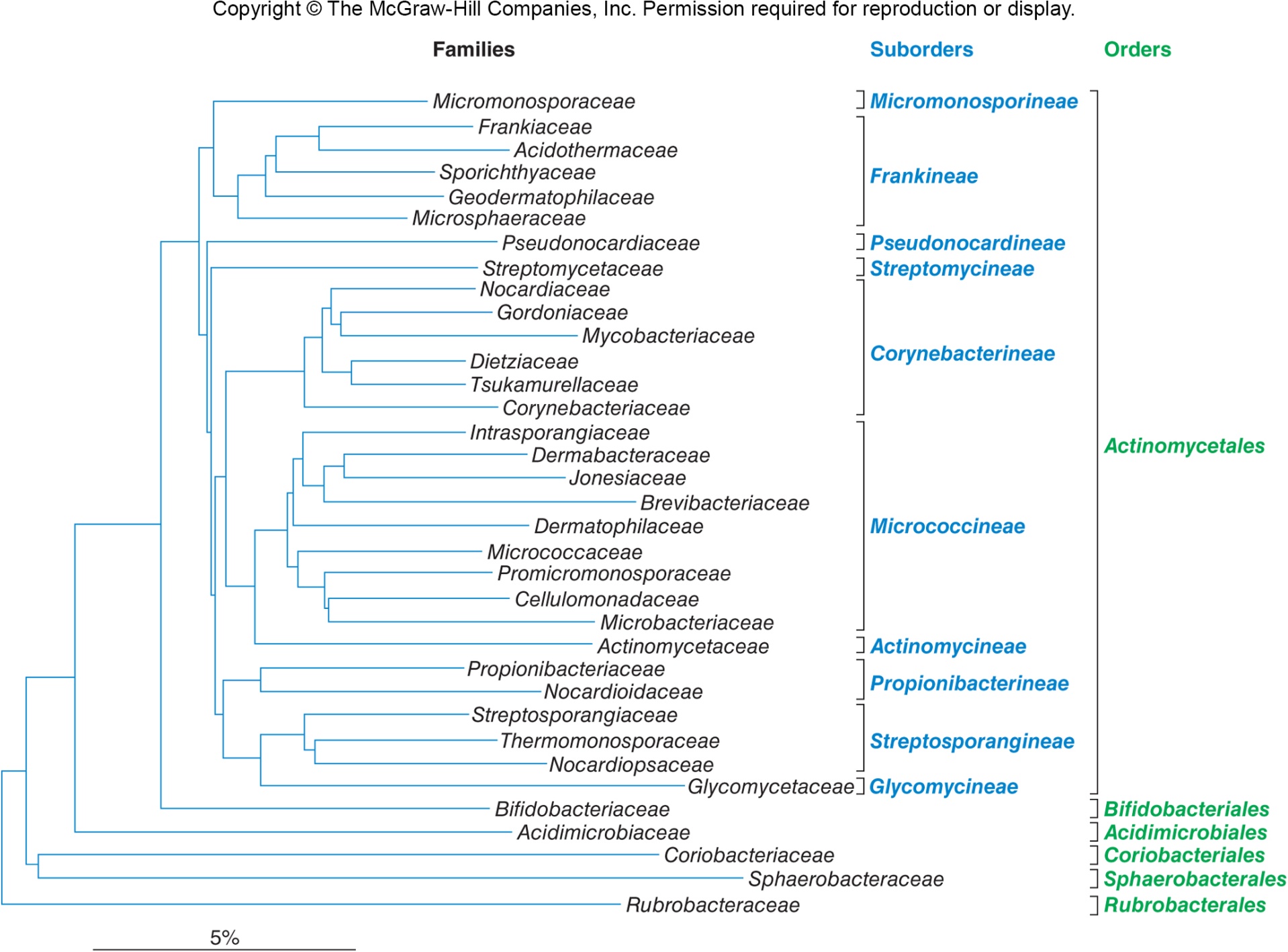
The High G + C Gram-Positive Bacteria were grouped in this phylum; figure 1 demonstrates the phylogenetic position of this phylum.

****

**Figure .1 Phylogenetic position of *Actinobacteria***

16S rRNA evidence of this phylum shows 1 class only (*Actinobacteria*),classified into five subclasses distributed to six orders with14 suborders categorized to 44 families (figure.2) .

**Phylum *Actinobacteria*** Consists of Actinomycetes and their high G + C Gram-positive relatives.

****

**Figure.2 Classification of *Actinobacteria***

**In this lecture we will explain two orders of phylum *Actinobacteria* :*Actinomycetales* and *Bifidobacteriales***

**General Properties of the Actinomycetes**

* Gram-positive, aerobic bacteria that produce filamentous cells called hyphae and differentiate into asexual spores.
* Adapt to climates similar to fungi.
* Source of most currently used antibiotics.
* Also produce metabolites that are anticancer, antihelminthic, and immunosuppressive.
* Complex life cycle.
* Most are not motile and motility is restricted to flagellated spores

**Characteristics Used in Actinomycetes Taxonomy**

According to peptidoglycan structure and sugar content other than N-acetylglucosamine and N-acetylmuramic acid, four major cell wall types were characterized.

**Life Cycle of Actinomycetes**

Involves development of filamentous cells (hyphae) and spores .Hyphae can form branching network .Aerial mycelium can form.

**Ecological Significance of Actinomycetes**

Widely distributed in soil .Play important role in mineralization of organic matter.Most are free living, but a few are pathogens

***Actinomycetales* order is divided into 10 suborders (fig.2)**

**Suborder *Actinomycineae***

This group contains one family *Actinomycetaceae* with five genera

Irregularly shaped, Gram-positive rods ,swelling, club shapes, or other deviations from normal rod morphology.Aerobic or facultative metabolism

**Genus *Actinomyces***

**Scientific classification**

**Domain Bacteria**

**Phylum Actinobacteria**

**Class Actinobacteria**

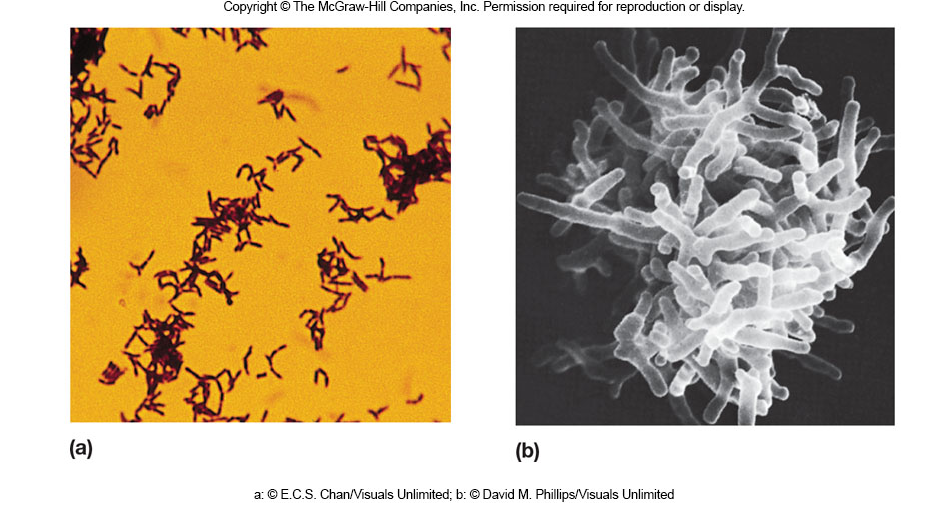
**Order Actinomycetales**

**Family Actinomycetaceae**

**Genus Actinomyces**

* Straight or slightly curved rods and slender filaments with true branching : may have swollen, clubbed, or clavate ends (fig.3).
* Facultative or obligate aerobes (require CO2).
* Peptidoglycan contains lysine and not diaminopimelic acid or glycine.
* Normal inhabits of oral mucosa.

Cause of lumpy jaw in cattle, ocular infection, actinomycoses, and peridontal disease in humans.



**Figure.3 *Actinomyces***

**Suborder *Micrococcineae***

**Genus *Micrococcus***

**Scientific classification**

**Domain Bacteria**

**Phylum Actinobacteria**

**Class Actinobacteria**

**Order Actinomycetales**

**Family Micrococcaceae**

**Genus Micrococcus**

* Aerobic, catalase-positive rods that occur in pairs, tetrads, or irregular clusters (fig.4)
* Usually non motile
* Often pigmented yellow, orange, or red
* Widespread in soil, water, and on human skin
* Does not undergo morphological differentiation

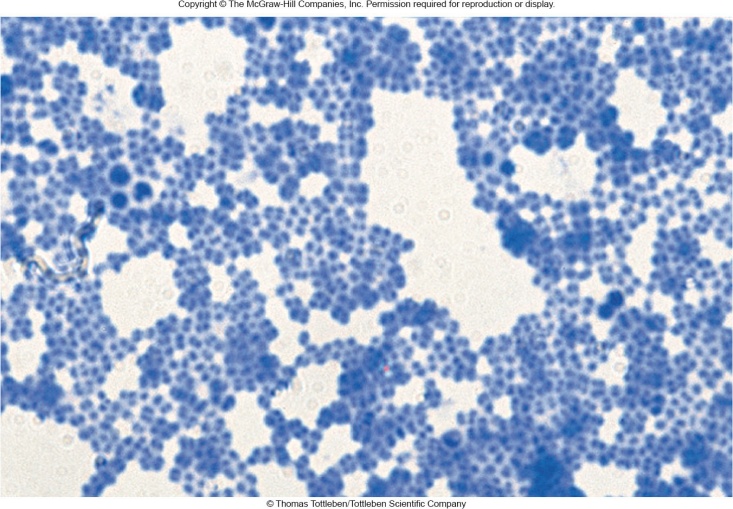


Figure .4 ***Micrococcus***

**Suborder Corynebacterineae**

This suborder has seven families with many known genera such as ; *Corynebacterium* , *Mycobacterium* , *Nocardia*

**Genus *Corynebacterium***

**Scientific classification**

**Domain Bacteria**

**Phylum Actinobacteria**

**Class Actinobacteria**

**Order Actinomycetales**

**Family Corynebacteriaceae**

**Genus Corynebacterium**

Species *C****. diphtheriae***

* Aerobic and facultative, catalase positive . Straight to curved rods with tapered ends and club shaped (fig.5 b).
* After snapping division bacteria often remain partially attached resulting in palisade arrangements of cells(fig.5 a).
* Form metachromatic granules.
* Cell walls have meso-diaminopimelic acid.
* Some are harmless soil and water saprophytes.
* Many are animal and human pathogens.

Most common and important genus is ***C****.* ***diphtheriae*** which causes diphtheria in human.

